GCSE

C300U10-1

S24-C300U10-1

THURSDAY, 16 MAY 2024 – MORNING

MATHEMATICS – Component 1
Non-Calculator Mathematics
FOUNDATION TIER

2 hours 15 minutes

ADDITIONAL MATERIALS

An additional formulae sheet.

The use of a calculator is not permitted in this examination.

A ruler, protractor and a pair of compasses may be required.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Do not use gel pen or correction fluid.

You may use a pencil for graphs and diagrams only.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet. If you run out of space, use the additional page(s) at the back of the booklet, taking care to number the question(s) correctly.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the need for good English and orderly, clear presentation in your answers.

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	7	
2.	3	
3.	5	
4.	6	
5.	2	
6.	4	
7.	4	
8.	7	
9.	3	
10.	2	
11.	5	
12.	3	
13.	4	
14.	5	
15.	3	
16.	4	
17.	5	
18.	4	
19.	3	
20.	2	
21.	4	
22.	5	
23.	4	
24.	5	
25.	4	
26.	3	
27.	4	
28.	6	
29.	4	
Total	120	

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01

JUN24C300U10101

Please note that these worked solutions have neither been provided nor approved by Eduqas and may not necessarily constitute the only possible solutions. Please refer to the original mark schemes for full guidance.

Any writing in blue should be written in the exam.

Anything written in green in a rectangle doesn't have to be written in the exam.

If you find any mistakes or have any requests or suggestions, please send an email to curtis@cgmaths.co.uk

.CG Maths.

Formula list

Area and volume formulae

Where r is the radius of the sphere or cone, l is the slant height of a cone and h is the perpendicular height of a cone:

Curved surface area of a cone = πrl

Surface area of a sphere = $4\pi r^2$

Volume of a sphere = $\frac{4}{3}\pi r^3$

Volume of a cone = $\frac{1}{3}\pi r^2 h$

Kinematics formulae

Where a is constant acceleration, u is initial velocity, v is final velocity, s is displacement from the position when $t = 0$ and t is time taken:

$$v = u + at$$

$$s = ut + \frac{1}{2}at^2$$

$$v^2 = u^2 + 2as$$

Examiner only

Answer **all** questions.

1. (a) Write down the value of 2 in the number 1·27. [1]

0.2 ← The 2 is in the tenths column, the 1st decimal place

(b) Write 32 928 correct to the nearest 1000. [1]

33000 ← The 9 in the hundreds column after the 2 in the thousands column causes the 2 to round up to 3. Then everything after the thousands column is ignored and is set to 0

(c) Write down the value of 8^2. [1]

64 ← $8^2 = 8 \times 8 = 64$

(d) Calculate 20 + 4 ÷ 4. [1]

21 ← The order of operations (BIDMAS) must be followed, so the division must be done first. 4 ÷ 4 = 1 then 21 + 1 = 21

(e) Calculate 0·4 + 0·21. [1]

$$\begin{array}{r} 0.40 \\ +0.21 \\ \hline 0.61 \end{array}$$

← Using column addition so that the digits are in the correct decimal places when adding

0.61

(f) Write these numbers in order of size. Start with the smallest number. [1]

5 –7 3·2 –7·5

-7.5 -7 3.2 5

Smallest Largest

The more negative or less positive a number is, the smaller it is

(g) Write the following inequality in words. [1]

$$-4 < x$$

-4 is less than x ← The inequality symbol points toward the smaller value

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2. Lewis has a bag containing 10 coloured counters.
He chooses one counter from the bag at random.

(a) There is an even chance that Lewis chooses a blue counter.
How many blue counters are there in his bag? [1]

5 ← Even chance means that the probability of choosing a blue counter is half, so half of the 10 counters must be blue. 10 ÷ 2 = 5

(b) It is impossible for Lewis to choose a red counter.
How many red counters are there in his bag? [1]

0 ← There must be 0 red counters otherwise there would be some chance of choosing a red counter. Impossible means that there is no chance

(c) It is unlikely that Lewis chooses a yellow counter.
What is the smallest number of yellow counters that Lewis could have in his bag? [1]

1 ← Unlikely means that there is some chance but less than half chance. So the smallest number of yellow counters is 1

3. (a) Write $\frac{3}{50}$ as a percentage. [1]

$\frac{6}{100}$ ← Percentage is out of 100. Multiplying both the numerator and denominator by 2 gives 100 as the denominator

6% ← Now the fraction has 100 as the denominator, the numerator must be the percentage

(b) Calculate $\frac{3}{5}$ of 20. [2]

20 ÷ 5
4 × 3 ← To do a fraction of an amount: divide the amount by the denominator then multiply the result by the numerator

12

(c) Calculate 70% of 50. [2]

50 ÷ 10 ← Dividing the 50 by 10 finds that 10% of 50 is 5

5 × 7 ← Multiplying the value of 10% by 7 finds that 70% of 50 is 35

35

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4. (a) Kelly is planning a family trip to the zoo.

The 2 adults and 3 children will all travel in the same car.
Each person will need an entrance ticket and lunch.

The costs for the trip are:

Petrol	£40
Tickets to the zoo	£15 per adult £10 per child
Lunch	£12 per adult £7 per child

Kelly has £180 to spend on the trip.
She pays for the petrol, the tickets and the lunches.
How much money will she have left? [4]

15
× 2
30
1

Multiplying the £15 per adult by the 2 adults finds that it costs £30 for the tickets to the zoo for the adults

10 × 3 = 30

Multiplying the £10 per child by the 3 children finds that it costs £30 for the tickets to the zoo for the children

12 × 2 = 24

Multiplying the £12 per adult by the 2 adults finds that it costs £24 for lunch for the adults

7 × 3 = 21

Multiplying the £7 per child by the 3 children finds that it costs £21 for lunch for the children

40
+30
+30
+24
+21
145
1

Adding all of the costs (the £40 petrol, the £30 tickets to the zoo for the adults, the £30 tickets to the zoo for the children, the £24 lunch for the adults, the £21 lunch for the children) finds that the total cost is £145

1 8 10
7 1
-1 4 5
0 3 5

Subtracting the £145 total cost from the £180 Kelly has to spend finds that she has £35 left

Kelly has ..... £35 ..... left.

(b) Last year, 10% of visitors to the zoo bought a bag of animal feed.

This year the zoo expects 650 000 visitors.
How many bags of animal feed do they expect to sell this year? [2]

650000 ÷ 10

Dividing the 650000 visitors by 10 finds that 10% of the visitors is 65000

65000

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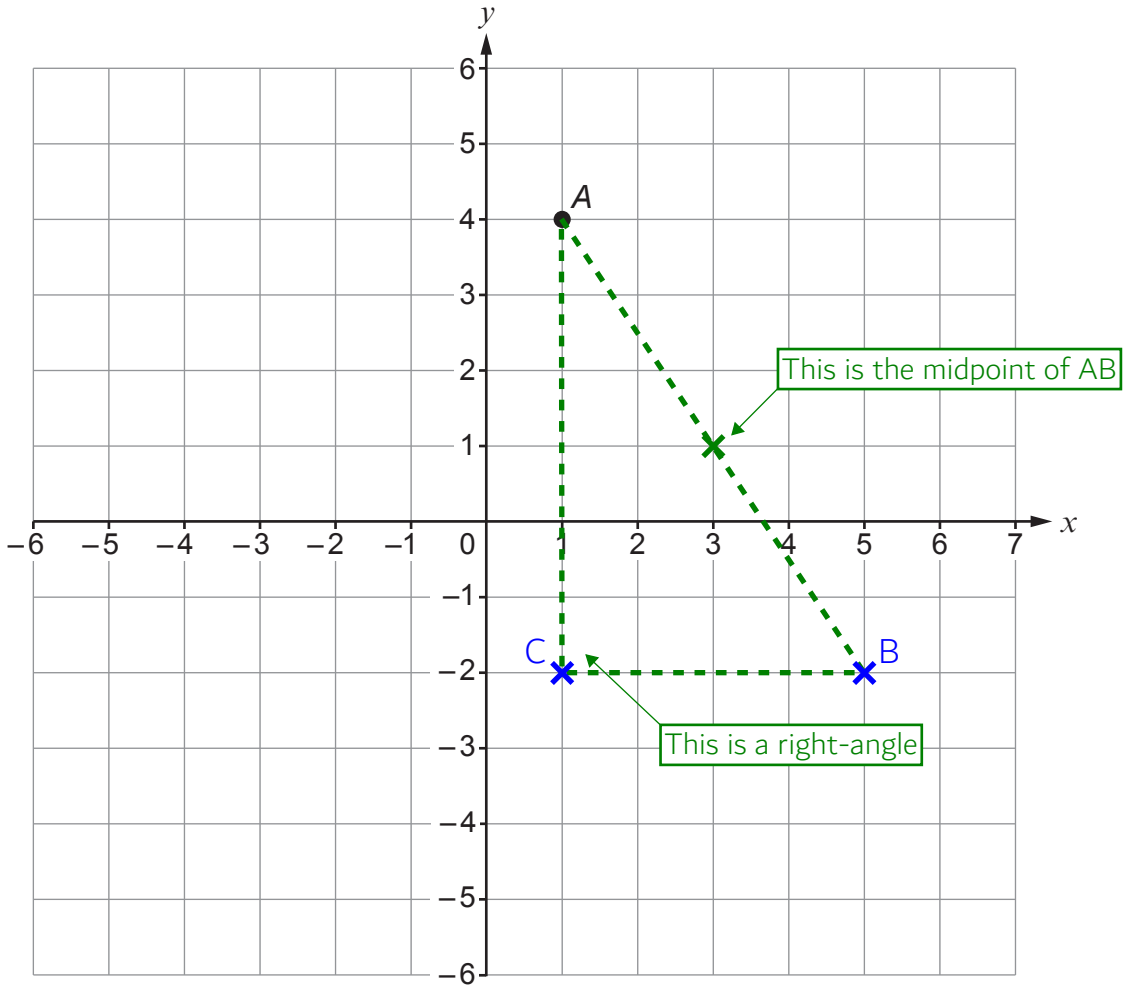
5. (a) Circle the expression that is the same as '4 more than y'. [1]

$y-4$ $\quad$ $4+y$ $\quad$ $\frac{4}{y}$ $\quad$ $4y$ $\quad$ $\frac{y}{4}$

(b) Calculate the value of $-8x$ when $x = -3$. [1]

24 ← Substituting -3 for x gives -8 × -3 = --24 = 24

6.



(a) On the grid, plot the point B (5, –2). ← (x-coordinate, y-coordinate) [1]

(b) ABC is a triangle with a right-angle at C.
Plot the position of the point C. [1]

(c) Find the coordinates of the midpoint of the line AB. [2]

Coordinates of the midpoint of line AB are (3 , 1)

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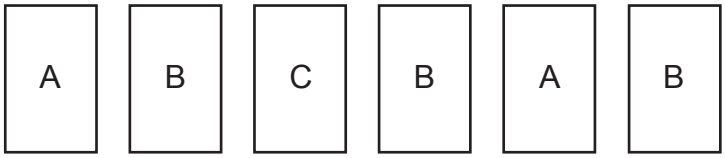
7. David has 6 cards.
Each card has a letter on it.



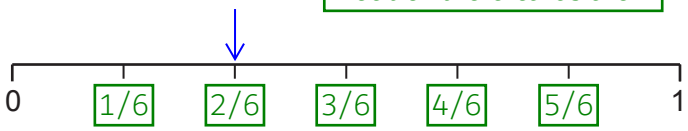
(a) Which letter is the mode? [1]

B ← The mode is the letter which appears the most

(b) One of the cards is chosen at random.

(i) On the probability scale below, mark with an arrow (↓) the probability that the card chosen has a letter A on it. [1]

2 out of the 6 cards are A



(ii) Write down the probability that the card chosen has a letter C on it. [1]

$\frac{1}{6}$ ← 1 out of the 6 cards are C

(c) Write down the ratio of the number of cards with a letter A to the number of cards with a letter B. [1]

A : B = 2 : 3

2 of the cards are A and 3 of the cards are B. Writing this as a ratio

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8. (a) Simplify $4 \times w \times 3 \times y$. [1]

12wy ← Multiplication can be done in any order. 3 × 4 = 12 then writing wy next to this means that they are multiplied

(b) In **each** of the spaces below, write a term to make the statement correct. [1]

$f +$ 6f $-$ f $= 6f$

f + 6f = 7f then 7f - f = 6f

(c) Solve each of the following equations.

(i) $6x = 48$ [1]

x = 8 ← Dividing both sides by 6 eliminates the 6 on the left and gets x on its own

(ii) $\frac{a}{4} = 40$ [1]

a = 160 ← Multiplying both sides by 4 eliminates the 4 on the left and gets a on its own

(d) Twowheels is a bike hire company.
Customers can hire bikes from Twowheels for a whole number of days.

The company uses the following formula to calculate its hire costs.

Bike hire cost = £20 + £15 × number of hire days

Tom wants to hire a bike from Twowheels.
He has £150 to spend.

What is the greatest number of days for which Tom can hire a bike? [3]

150 = 20 + 15n ← Substituting the bike hire cost into the formula and letting n be the number of hire days

130 = 15n ← Subtracting 20 from both sides to get the n term on its own

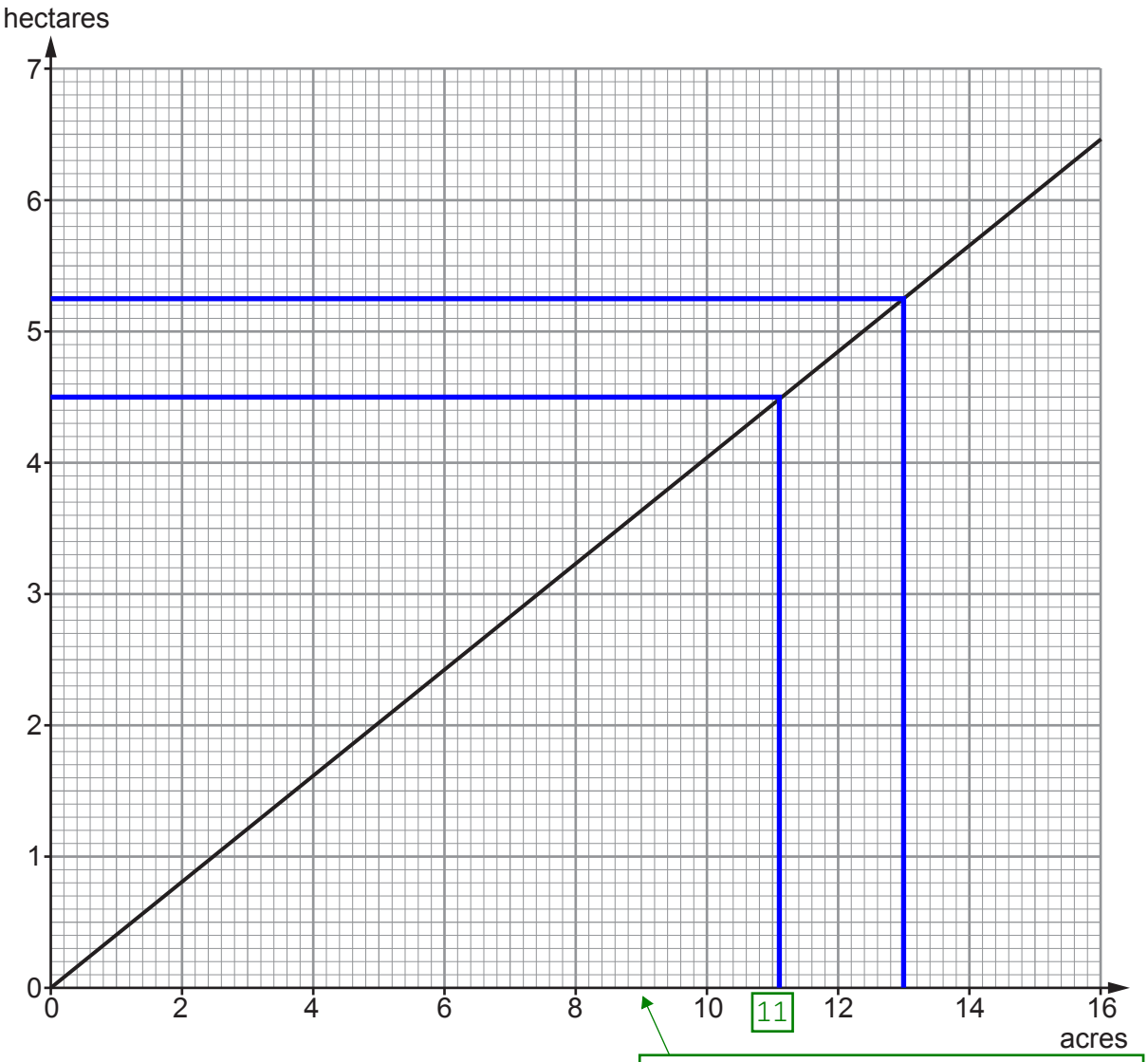
15, 30, 45, 60, 75, 90, 105, 120, 135 ← Dividing both sides by 15 gets n on its own. Listing the 15 times table to find how many lots of 15 go into the 130

It would cost £120 for 8 days. It would cost £135 for 9 days, which is too much

Tom can hire a bike for ..... 8 ..... days

Examiner only

9. The conversion graph below can be used to convert between acres and hectares.



This scale goes up 2 over 10 small boxes. 2 ÷ 10 = 0.2, so each small box is worth 0.2 and half a small box is worth 0.1

Use the graph to answer the following questions.

(a) How many acres are equal to 4·5 hectares? [1]

11.1 ← Reading across from 4.5 hectares to the line then down converts it to acres

(b) Complete the following statement.
You must show all your working. [2]

26 acres is equal to ..10.5.. hectares.

$$\begin{array}{r} 5.25 \\ \times\ 2 \\ \hline 10.50 \\ {\scriptstyle 1} \end{array}$$

13 acres is half of 26 acres. Reading up from 13 acres to the line then across converts it to 5.25 hectares. Then multiplying this by 2 finds that 26 acres is 10.5 hectares

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Examiner only

10. A shop that sells scented candles is holding a sale.
The original price of each candle was £3.

In the sale, the candles are sold at half price.
Sam has £38.
Sam thinks that the maximum number of candles that she can now buy is exactly twice as many as she could buy at the original price.

Is Sam correct?

☐ Yes ☑ No

You must explain your reasoning. [2]

$$\begin{array}{r} 1.\ 5\ 0 \\ 2\overline{)\,3.\,{}^{1}0\ 0} \end{array}$$

← Dividing the £3 original price by 2 finds that half price is £1.50

38 ÷ 3 = 12 r 2 ← 12 lots of £3 go into £38 with £2 remaining. So she could buy 12 candles at the original price

12 × 2 ← If the price is halved, twice as many candles can now be bought for £36 (ignoring the remaining £2)

24 + 1 ← 1 more candle can be bought with the remaining £2 as in the sale they are sold for £1.50

She could buy 12 but can now buy 25 ← 25 is not exactly twice 12

Examiner only

11. Here is part of a train timetable between London Paddington and Bristol Parkway.

London Paddington	18:01	18:18	18:43	19:18	19:48	20:01
Reading		18:43	19:10	19:43	20:13	
Swindon		19:10	19:37	20:10	20:40	
Bristol Temple Meads	19:30					21:34
Bristol Parkway	19:46	19:51	19:59	20:31	21:01	21:56

(a) Darren catches the 19:48 train from London Paddington to Bristol Parkway.
How many **minutes** should his train journey take? [2]

19:48 → 20:00 : 12 ← It is 12 minutes from 19:48 to 20:00
20:00 → 21:00 : 60 ← It is 60 minutes from 20:00 to 21:00
21:00 → 21:01 : 1 ← It is 1 minute from 21:00 to 21:01

73 minutes ← 12 + 60 + 1 = 73

(b) Jennifer lives in London.
She went to an event in Swindon.

Jennifer left her house at 6:10 p.m.
It took her 10 minutes to get to London Paddington station.
She then took the next train to Swindon.
This train arrived in Swindon on time.
It then took her 12 minutes to get to the event.

The event started at 7:45 p.m.
How many minutes late did Jennifer arrive at the event?
You must show your working. [3]

18:10 + 0:10 = 18:20 ← 6:10 pm is 18:10. 10 minutes after this is 18:20. So the next train from London Paddington is the 18:43

19:37 + 0:12 = 19:49 ← The 18:43 from London Paddington arrives in Swindon at 19:37. 12 minutes after this is 19:49, which is 7:49 pm

7:49 pm is 4 minutes after 7:45 pm

Jennifer arrived ..... 4 ..... minutes late

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12. (a) Lisa, Flynn and Jane each have a number of marbles.

Jane has 8 marbles.

Jane has half as many marbles as Flynn.
Flynn has 4 times as many marbles as Lisa.

Write the numbers of marbles they each have as a ratio.
Give your answer in its simplest form. [2]

F = 8 × 2 = 16 ← Flynn has twice as many marbles as Jane, so has 16 marbles

L = 16 ÷ 4 = 4 ← Lisa has a quarter of the number of marbles that Flynn has, so has 4 marbles

4 : 16 : 8 ← Writing the ratio without simplifying

Dividing all sides of the ratio by 4 gives smaller whole numbers

Lisa : Flynn : Jane = 1 : 4 : 2

The ratio cannot go simpler as 1 cannot be divided to get a smaller whole number

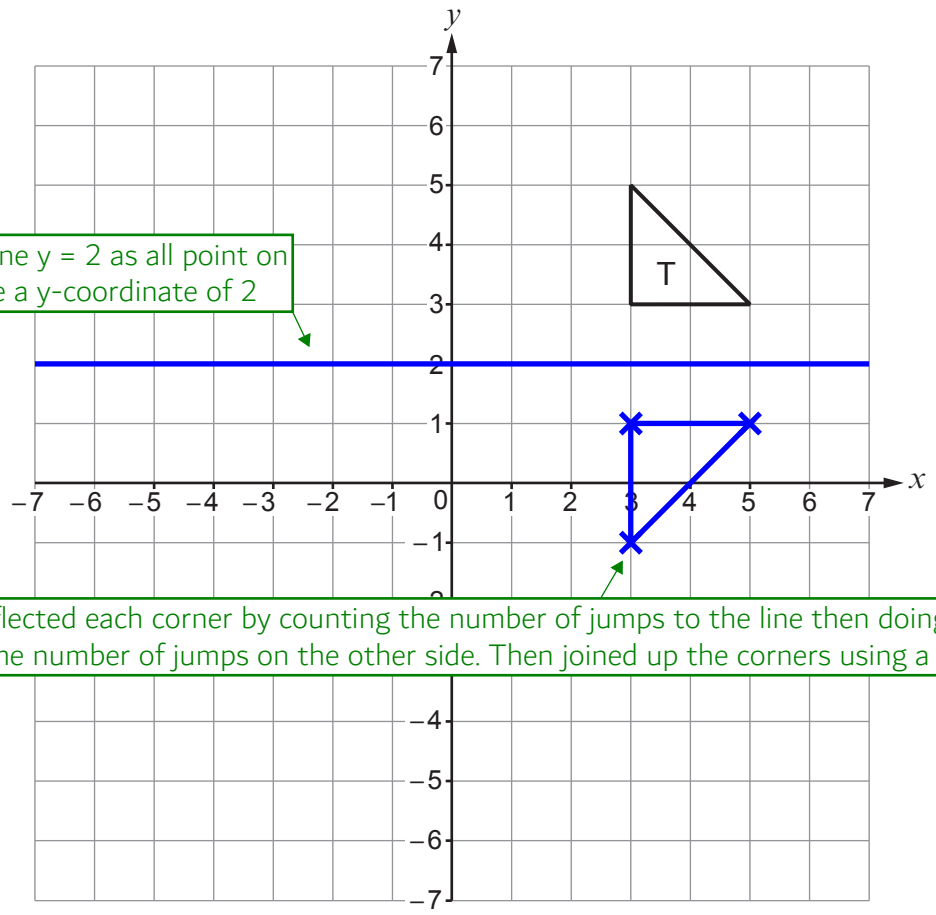
(b) Siân is trying to write 2 m to 30 cm as a ratio in its simplest form.
Here is her working.

Explain why Siân's answer is **not** correct. [1]

Different units ← For a ratio, all sides need to be using the same unit. 1 m is 100 cm so the ratio would actually be 100 : 15, which simplifies to 20 : 3

Examiner only

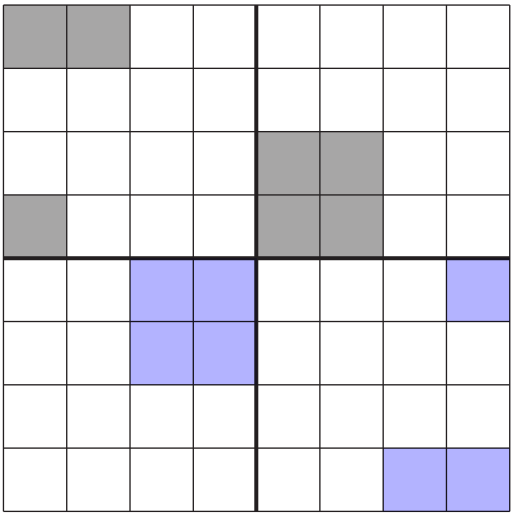
13. (a) Reflect the triangle T in the line $y = 2$. [2]



This is the line y = 2 as all point on the line have a y-coordinate of 2

Reflected each corner by counting the number of jumps to the line then doing the same number of jumps on the other side. Then joined up the corners using a ruler

(b) Shade the least number of squares in the lower two quadrants so that the grid has rotational symmetry of order 2. [2]



The grid can now be rotated 2 times within a full turn with it looking the same.
Imagining turning the grid upside-down helps to visualise what the grid should look like

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14. (a) Suzanne drives from Liverpool to Hull.
She drives at an average speed of 52 miles per hour for $2\frac{1}{2}$ hours.
Calculate the distance that Suzanne travels. [2]

s d t ← Writing a formula triangle for speed, distance, time. Covering d finds that distance = speed × time

52
× 2 ← Multiplying the 52 miles per hour by 2 hours finds that 104 miles are done in 2 hours
104

2 6 ← Dividing the 52 miles by 2 finds that 26 miles are done in the 1/2 hour
2 ⟌ 5 ¹2

104 ← Adding the 104 miles done in the 2 hours and the 26 miles done in the 1/2 hour finds that 130 miles are travelled
+ 26
130
1

Suzanne travels ..... 130 ..... miles

(b) Suzanne planned her journey using a map.
The map has a scale of 1:200 000.

On the map, the distance between two roundabouts measures 3 cm.
What is the actual distance in **kilometres**? [3]

200000
× 3 ← The 200000 is 200000 times greater than the 1 in the ratio so multiplying the 3 cm by 200000 finds that the actual distance is 600000 cm
600000

6000 m ← There are 100 cm in 1 m. So dividing the 600000 cm by 100 converts it to 6000 m

There are 1000 m in 1 km. So dividing the 6000 m by 1000 converts it to 6 km

The actual distance is ..... 6 ..... km

15. (a) Factorise $3a + 7ab$. [1]

a(3 + 7b) ← There are no common factors of 3 and 7 which are greater than 1. a is in common to both terms. There are no other letters in common to both terms. So bringing a out as a factor. Dividing both terms by a and leaving the result in a bracket

(b) Make w the subject of the formula $y = 5w - 4$. [2]

y + 4 = 5w ← Adding 4 to both sides eliminates the -4 on the right and gets the w term on its own

$\frac{y + 4}{5}$ = w ← Dividing both sides by 5 eliminates the 5 on the right and gets w on its own

Examiner only

16. In the diagram below, *BE* is a straight line.

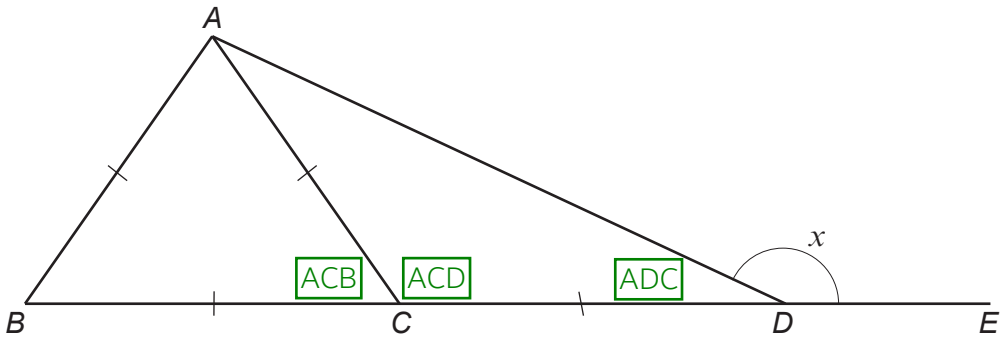

Diagram not drawn to scale

Show that x = 150°.
You must give a reason for each step of your working. [4]

180 ÷ 3

Angle ACB = 60° as there are 180° in a triangle and all angles are equal in an equilateral triangle

Triangle ABC is equilateral as it has three equal sides

180 - 60

Angle ACD = 120° as there are 180° around a point on a straight line

180 - 120

60 ÷ 2

Angle ADC = 30° as there are 180° in a triangle and the base angles of an isosceles triangle are equal

Triangle ACD is isosceles as it has two equal sides. The equal base angles are opposite the equal sides

180 - 30

Angle x = 150° as there are 180° around a point on a straight line

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17. (a) Calculate 0·4 ÷ 0·01. [1]

$40 \div 1$ ← Multiplying both the 0.4 and the 0.01 by 100 makes an equivalent division which is easier as it gets rid of the decimal in 0.01

40 ← Anything divided by 1 is itself

(b) Calculate each of the following.
Give your answers in their simplest form.

(i) $\frac{1}{4}+\frac{3}{5}$ [2]

$\frac{5}{20} + \frac{12}{20}$ ← Multiplying both the numerator and denominator of the 1st fraction by 5 and multiplying both the numerator and denominator of the 2nd fraction by 4 gives 20 as a common denominator for both fractions

$\frac{17}{20}$ ← Adding the numerators and the denominator stays the same. It cannot go simpler as 17 and 20 cannot be divided by the same amount to get smaller whole numbers

(ii) $\frac{5}{6}\times\frac{3}{10}$ [2]

$\frac{1}{2} \times \frac{1}{2}$ ← Dividing the 5 and 10 by 2 and dividing the 6 and 3 by 3 makes the multiplication simpler

$\frac{1}{4}$ ← Multiplying the numerators and multiplying the denominators

Examiner only

18. The diagram below shows rectangle *ABCD*.

Opposite sides of a rectangle are equal

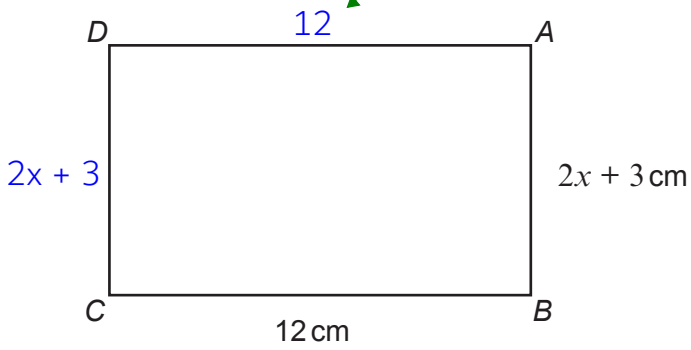


Diagram not drawn to scale

AB = $2x + 3$ cm and *BC* = 12 cm.

The perimeter of the rectangle is 40 cm.
Calculate the value of x. [4]

$4x + 30 = 40$ ← Perimeter is the outside sides all added together. Adding the x terms gives 2x + 2x = 4x. Adding the other terms gives 12 + 12 + 3 + 3 = 30. So the perimeter of the rectangle is 4x + 30, which must be equal to the 40 cm

$4x = 10$ ← Subtracting 30 from both sides eliminates the +30 on the left and gets the x term on its own

$$4 \overline{)\, 1\,{}^{1}0.{}^{2}0} \quad 0\ 2.5$$

← Dividing both sides by 4 eliminates the 4 on the left and gets x on its own

$x =$ 2.5

Examiner only

19. Write down five positive whole numbers in the boxes below such that the numbers have:

- a range of 5 **and**
- a mean of 4 **and**
- a median of 3. [3]

4 × 5 ← Mean = total ÷ number, where total is the total of all the numbers and number is how many numbers there are. So total = mean × number = 4 × 5 = 20. All five numbers must add up to 20

The median is the middle number when they are put in order. So 3 must go in the middle

20 - 3 ← Subtracting the 3 from the total of 20 finds that the other four numbers must add up to 17

The range is the difference between the largest and the smallest number. So putting 2 in the first box and 7 in the last box as 7 - 2 = 5. The 1st number must be 3 or less and the 5th number must be 3 or more in order for the numbers to be written in order

17 - 9 ← 2 + 7 = 9. Subtracting this 9 from the 17 finds that the other two numbers must add up to 8. 2 and 6 can be put into the remaining two boxes as these add up to 8 and also keeps the numbers in order

2	2	3	6	7

Examiner only

20. Robin makes the two cubes below from centimetre cubes.

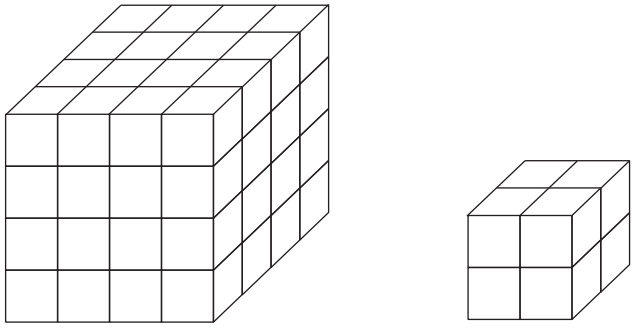


Diagram not drawn to scale

Sarah uses **all** of Robin's centimetre cubes to make a **single** cuboid.

Each of the dimensions of Sarah's cuboid will be greater than one centimetre.

Give the dimensions of a cuboid that Sarah could make. [2]

4×4

16

$\times 4$

64

^{2}

Volume of cube = length^3. So the volume of the larger cube is $4 \times 4 \times 4 = 64$ cm^3

2×2

4×2

Volume of cube = length^3. So the volume of the smaller cube is $2 \times 2 \times 2 = 8$ cm^3

64

$+ 8$

72

^{1}

Adding the volumes of the two cubes finds that there are 72 centimetre cubes in total

$$2\overline{)7\,{}^{1}2}\quad 3\ 6$$

Volume of cuboid = length × width × height. Dividing the volume of 72 cm^3 by a height of 2 cm finds that the length × width could be 36

2cm by 4cm by 9cm

So the length could be 9 cm and the width could be 4 cm as $4 \times 9 = 36$. This works as $2 \times 4 \times 9 = 72$

Examiner only

21. (a) **Estimate** the value of $\frac{2\cdot13\times99\cdot4}{39\cdot5}$.

You must show all your working. [2]

2×100 ← Rounding 2.13 to 1 significant figure gives 2. Rounding 99.4 to 1 significant figure gives 100. So 2.13 × 99.4 is roughly 200

$200 \div 40$ ← Rounding 39.5 to 1 significant figure gives 40

5

(b) Given that 3·4 × 7·8 = 26·52, write down the answer to each of the following:

(i) 34×78 [1]

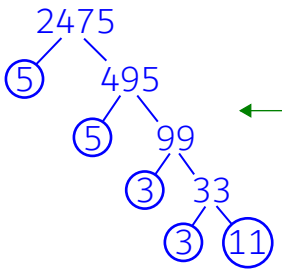
2652 ← Both the 3.4 and 7.8 are multiplied by ten. So the answer will be multiplied by ten twice

(ii) $\frac{26\cdot52}{34}$ [1]

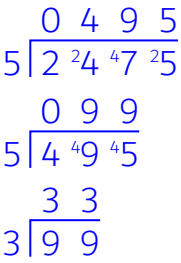
0.78 ← 26.52 ÷ 3.4 = 7.8. As the 3.4 is multiplied by ten and it is a denominator, this divides the answer by ten

Examiner only

22. (a) Write 2475 as a product of its prime factors in index form. [3]



Doing a factor tree and circling the primes



$3^2 \times 5^2 \times 11$ ← 2475 = 3 × 3 × 5 × 5 × 11. Writing this in index form

(b) Write down the square root of $64 \times 5^4 \times 7^4$.
Give your answer as a product of prime factors in index form. [2]

$\sqrt{64} = 8$ ← 8 × 8 = 64 so the square root of 64 is 8

$2^3 \times 5^2 \times 7^2$ ← Halving the power of 5^4 and 7^4 square roots them. $8 = 2^3$

Examiner only

23. Pippa and Joe are working on a school project.
The project is based on the use of the local leisure facilities.

(a) Pippa decides to ask adults how much they spend on gym membership each month.
In the box below, write a suitable question with appropriate response boxes to collect this information. [2]

Question

How much do you spend on gym membership each month?

Response boxes

Less than £10 ☐ £10 to £20 ☐ More than £20 ☐

(b) Joe asked some adults how many hours they each spent at the leisure centre during the previous week.
His results are shown below.

Number of hours	0–4	5–9	10–14	15–19	20–24
Number of adults	9	2	1	1	2

Joe accurately calculated an estimate of the mean time spent per adult to be 7 hours.

In his project he stated:

'On average, the adults in my survey each spent 7 hours at the leisure centre last week.'

(i) Explain why the mean is not the best average to use for this data. [1]

The mean is effected by outliers ← The two people who spend 20-24 hours brings the mean up but most people spend 0-4 hours

(ii) Give **one** other reason why Joe's results may not be reliable. [1]

Small sample

Examiner only

24. An empty water tank is filled using a hose with a steady rate of flow.

The tank takes:

- 30 minutes to fill if water is added at x litres/min
- 40 minutes to fill if the water is added at $(x-2)$ litres/min.

Form an equation in terms of x.
Solve the equation and hence find the capacity of the tank in litres. [5]

s d t ← Writing a formula triangle for distance, speed, time. The distance is the capacity of the tank and the speed is the rate in which the water fills the tank

40(x - 2) ← Covering d finds that the capacity of the tank = rate × time. Multiplying the 40 minutes by the rate of (x - 2) expresses the capacity of the tank

40x - 80 = 30x ← Expanding the brackets and setting it equal to the 30 minutes multiplied by the rate of x, which also expresses the capacity of the tank

10x - 80 = 0 ← Subtracting 30x from both sides to get all the x on the same side

10x = 80 ← Adding 80 to both sides to get the x term on its own

x = 8 ← Dividing both sides by 10 to get x on its own

30 × 8 ← Covering d finds that the capacity of the tank = rate × time. Multiplying the 30 minutes by the rate of 8 expresses the capacity of the tank

240 L ← Litres was involved in the unit of the rate so the unit of capacity worked out must be litres

25. Three friends, Louis, Krystal and Jamal win some money in a competition.
They share the money in the ratio 3 : 7 : 11.

(a) What fraction of the total money won is given to Jamal? [1]

$\frac{11}{21}$ ← 3 + 7 + 11 = 21 parts in total in the ratio. 11 out of these 21 parts are for Jamal

(b) **Jamal** spends £45 of the money he won.
He now has exactly twice as much as **Louis** won.
How much money did **Krystal** win? [3]

3p × 2 ← Louis won 3 parts of the ratio. Multiplying this by 2 finds that exactly twice as much as Louis won is represented by 6 parts of the ratio

11p - 6p ← Subtracting the 6 parts representing exactly twice as much as Louis won from the 11 parts which Jamal won finds that the difference is 5 parts of the ratio

5p = 45 ← The 5 parts of the ratio (which is the difference between exactly twice as much as Louis won and what Jamal won) must be equal to the £45 Jamal spends

p = 9 ← Dividing both sides by 5 finds that 1 part of the ratio is worth £9

7 × 9 ← Krystal gets 7 parts of the ratio. So multiplying the value of 1 part of the ratio by 7 finds that Krystal won £63

£63

Examiner only

26. 6 printers take 36 minutes to print a number of identical booklets.
How long will it take 9 printers to print **half** as many of these booklets?
You may assume that all printers print at the same rate. [3]

$$\begin{array}{r} 36 \\ \times\ 6 \\ \hline 216 \\ {\scriptstyle 3} \end{array}$$

Multiplying the 36 minutes by the 6 printers finds that there is 216 minutes worth of work to do

$$9\overline{)\,2\,{}^{2}1\,{}^{3}6}\ \ 0\ 2\ 4$$

Dividing the 216 minutes worth of work to do by the 9 printers finds that it would take 24 minutes for 9 printers to do the same number of booklets

$24 \div 2$

There are half as many booklets so it will take half the amount of time

27. (a) The price of an item in a sale has been reduced by 25%.
If the sale price is £54, what was the original price of the item? [2]

$$3\overline{)\,5\,{}^{2}4}\ \ 1\ 8$$

25% is equivalent to 1/4. Reducing the original price by 1/4 reduces it to 3/4 of the original price. Dividing the sale price by 3 finds that 1/4 of the original price is £18

$$\begin{array}{r} 18 \\ \times\ 4 \\ \hline 72 \\ {\scriptstyle 3} \end{array}$$

Multiplying the value of 1/4 of the original price by 4 finds that the original price was £72

£72

(b) Percentage change can be calculated using multipliers.

(i) A number is decreased by 33% of its value.
Circle the multiplier that would find the value after this decrease. [1]

(0·67) –1·33 –0·67 0·33 0·77

100% - 33% = 67%. Dividing this by 100 converts it to the decimal multiplier 0.67

(ii) A number is increased by 6% of its value.
This is done 3 times, each time increasing the previous value by 6%.
Circle the multiplier that would find the value after the 3 increases. [1]

1·06 1·18 $(1{\cdot}06^3)$ 0·18 $0{\cdot}06^3$

100% + 6% = 106%. Dividing this by 100 converts it to the decimal multiplier 1.06. Raising it to the power of 3 increases by 6% 3 times. It is compound interest

Examiner only

28. Three friends, Luka, Mali and Nina buy some fruit.

Luka buys 3 apples and 4 bananas and pays £2.70.
Mali buys 2 apples and 3 bananas and pays £1.95.

Use an algebraic method to calculate how much Nina pays for 4 apples and 2 bananas. [6]

Simultaneous equations

$3A + 4B = 2.70$ ← Luka buys 3 apples and 4 bananas and pays £2.70. This forms the 1st equation

$2A + 3B = 1.95$ ← Mali buys 2 apples and 3 bananas and pays £1.95. This forms the 2nd equation

$6A + 8B = 5.40$ ← Multiplying all terms on both sides of the 1st equation by 2 forms the 3rd equation

$6A + 9B = 5.85$ ← Multiplying all terms on both sides of the 2nd equation by 3 forms the 4th equation

$B = 0.45$ ← Subtracting the 3rd equation from the 4th equation cancels out the A terms and gets an equation just in terms of B. So the cost of a banana is £0.45

$2A + 1.35 = 1.95$ ← Substituting £0.45 for B in the 2nd equation

$2A = 0.60$ ← Subtracting 1.35 from both sides gets the A term on its own

$A = 0.30$ ← Dividing both sides by 2 gets A on its own. So the cost of an apple is £0.30

$4 \times 0.30 = 1.20$ ← Multiplying the cost of an apple by 4 finds that the cost of 4 apples is £1.20

$2 \times 0.45 = 0.90$ ← Multiplying the cost of a banana by 2 finds that the cost of 2 bananas is £0.90

$1.20 + 0.90$ ← Adding the cost of 4 apples and the cost of 2 bananas finds that Nina pays £2.10

Nina pays ..... £2.10 .....

Examiner only

29. (a) Calculate the value of $\frac{1{\cdot}29\times10^{5}}{3\times10^{-7}}$.

Give your answer in standard form. [2]

$$3\overline{)1.\,^{1}2\;9}\;\;0.\;4\;3$$

← Dividing the 1.29 by the 3

0.43×10^{12} ← $10^{5} \div 10^{-7} = 10^{5\,-\,-7} = 10^{5\,+\,7} = 10^{12}$

4.3×10^{11} ← Multiplying the 0.43 by 10 once gives 4.3, which is at least 1 and less than 10. 10^{12} must be divided by 10 once to keep it equal, which subtracts 1 from the power

(b) Calculate the value of $\left(7{\cdot}6\times10^{5}\right)+\left(3\times10^{4}\right)$.

Give your answer in standard form. [2]

$7.6 \times 10^{5} + 0.3 \times 10^{5}$ ← Dividing the 3 by 10 and multiplying the 10^{4} by 10 (which adds 1 to the power) makes both terms have the same power of 10

7.9×10^{5} ← 7.6x + 0.3x = 7.9x

END OF PAPER